

EXAMINATION OF ACCEPTANCE AS A MEDIATOR
OF ANXIETY SENSITIVITY AND PERCEIVED DISABILITY
IN AN ONLINE CHRONIC ILLNESS SUPPORT GROUP SAMPLE

by

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Examination of Acceptance as a Mediator of Anxiety Sensitivity and Perceived Illness Disability in an Online Chronic Illness Support Group Sample

Thesis directed by Assistant Professor Abbie Beacham

ABSTRACT

Chronic illnesses account for 70% of deaths in the United States alone. The cost associated with these illnesses was \$1.3 trillion in the U.S. as of 2003, with an estimated future cost of \$4.2 trillion in 2023. Additionally, chronic pain affects roughly 50 million people in the U.S. and costs over \$70 billion annually in healthcare costs and lost productivity. A need exists to identify more effective forms of chronic illness management; instead of focusing on the treatment of a diagnosis specific condition, it may be beneficial to tailor interventions based on the idiographic presentation of the individual presenting with comorbid diagnoses. Acceptance has been studied in recent literature as applied to chronic pain patient populations. Clinical studies have identified chronic pain acceptance as a key construct in the experience of chronic pain and a reliable predictor of patient outcome. The purpose of this study was to broaden the scope of acceptance to include chronic illness in general, not solely chronic pain. This study examined the role of acceptance as a mediator of the relationship between anxiety sensitivity and perceived illness disability. Data for this study were archival. Study participants were recruited through online chronic illness support groups to complete self-report questionnaires. Seven sets of mediation analyses were conducted. Only one test of mediation was significant. Implications of the findings are discussed in terms of the possible differences in the experience of chronic pain and chronic illness.

The form and content of this abstract are approved. I recommend its publication.

Approved: Abbie Beacham

TABLE OF CONTENTS

CHAPTER

I.	INTRODUCTION.....	1
II.	REVIEW OF THE LITERATURE.....	3
	Behavioral and Cognitive Behavioral Factors Associated with Chronic Pain and Chronic Illness.....	3
	Perceived Disability.....	3
	Anxiety Sensitivity.....	4
	Acceptance.....	8
	Acceptance and Patient Outcomes.....	11
	Utility of a Broad Measure of Chronic Illness Acceptance.....	14
	Purpose of the Study.....	15
III.	METHODS.....	17
	Participants.....	17
	Measures.....	17
	Demographics.....	17
	Chronic Illness Acceptance Questionnaire.....	18
	Anxiety Sensitivity Index-III.....	19
	Perceived Illness Disability Index.....	19
	Study Analyses.....	19
	Examination of Indirect Effects.....	28
IV.	RESULTS.....	30
	Sample Characteristics.....	30
	Analyses of Primary Hypotheses.....	32

V.	DISCUSSION.....	42
	Sample Characteristics.....	42
	Mediation Analyses.....	43
	Limitations and Future Directions.....	48
	Summary.....	48
	REFERENCES.....	50
	APPENDIX	
A.	Chronic Illness Acceptance Questionnaire.....	56
B.	Anxiety Sensitivity Index-III.....	58
C.	Perceived Illness Disability Index.....	60

CHAPTER I

INTRODUCTION

Chronic illnesses, diseases “of long duration and generally slow progression” (World Health Organization, 2012) account for 70% of deaths in the United States alone (Kung, Hoyert, Xu, & Murphy, 2008). As of 2005, 133 million, or almost 1 in every 2, Americans had at least one chronic illness such as heart disease, cancer, or diabetes, while 63 million had multiple chronic illnesses (Wu & Green, 2000). These numbers are projected to increase as the population of the U.S. continues to age (Bodenheimer, Chen, & Bennet, 2009). The cost associated with these illnesses was \$1.3 trillion in the U.S. as of 2003, with an estimated future cost of \$4.2 trillion in 2023 (DeVol & Bedroussian, 2007). Additionally, chronic pain affects roughly 50 million people in the U.S. and costs over \$70 billion annually in healthcare costs and lost productivity (McCracken, Vowles, & Eccleston, 2004; Stewart, Ricci, Chee, Morganstein, Lipton, 2003).

Numerous studies have demonstrated the effectiveness of behavioral and cognitive-behavioral interventions for the management of chronic illness and chronic pain. Newman, Steed, and Mulligan (2004) found that self-management interventions for chronic illnesses resulted in improved patient outcomes such as reduction of glycated hemoglobin (HBA_{1c}) in diabetes patients. In a meta-analysis of behavioral and cognitive behavioral interventions for chronic pain, McCracken and Turk (2002) found reduction in pain, distress, and pain behavior, as well as improvement in daily functioning.

However, a need exists to identify more effective forms of chronic illness management. Patients often present with comorbid chronic illnesses, but to date interventions aim to treat singular diagnoses or conditions. For example, while asthma

and diabetes interventions focus primarily on illness control, the same cannot be said of chronic pain (Newman *et al.*, 2004). Future research may benefit from a paradigm shift: instead of focusing on the treatment of a diagnosis specific condition, it may be beneficial to tailor interventions based on the idiographic presentation of the individual presenting with comorbid diagnoses.

CHAPTER II

REVIEW OF THE LITERATURE

Behavioral and Cognitive Behavioral Factors Associated with Chronic Pain and Illness

Perceived Disability. According to the World Health Organization (2013), disability is a critical component of patient functioning. “Functioning and disability are viewed as a complex interaction between the health condition of the individual and the contextual factors of the environment as well as personal factors” (Centers for Disease Control, 2012). Accordingly, treating the resultant disability arising from chronic illnesses requires an idiographic perspective. As chronic illnesses are generally incurable, the central goal of treatment is improved function, not disease or symptom abatement. Focusing on disability shifts the focus from “cause to impact” (i.e., in what ways the individual is disabled as a result of his or her condition; World Health Organization, 2013).

Perceived disability is a measure of the degree to which an individual sees himself or herself as being disabled as a result of his or her illness or symptoms related to a chronic condition (Pollard, 1981). The construct has been studied extensively in relation to chronic pain with studies finding increased levels of perceived disability to be associated with increased ratings of pain (i.e., symptom) intensity (Arnstein *et al.*, 1999). Smith and Ahern (1985) conducted a study examining the utility of the Sickness Impact Profile (SIP) in chronic low back pain patients receiving treatment in a multidisciplinary chronic pain treatment setting. They found that individuals suffering from chronic pain perceived themselves as having “significant impairment in physical, psychosocial, and

work and recreational activities” (p. 74), including disability related to home management, social interaction, emotional behavior, and sleep. Alshuler, Theisen-Goodvich, Haig, and Geisser (2008) found that higher rating of pain intensity was associated with greater perceived disability, but not objectively rated disability as measured by a physical performance test.

In a study of the effect changes in depression and perceived disability had on functional outcomes, Lofland *et al.* (1997) found that decreased depression and perceived disability significantly predicted improvement in patients’ level of activity and overall function. Further analysis revealed that reduced perceived disability accounted for unique variance in functional outcomes. Specifically, reduced perceived disability was related to improvement in standardized functional capacity tests (e.g., measures of physical strength and range of motion), as well as increased daily activity. Recent small-scale studies have since used perceived disability as a dependent variable proxy for patient outcomes. Herbst, Beacham, Payne-Murphy, Crafton, and Katsikas (2010) examined the role of acceptance of pain and mindfulness in pain patient’s ratings of perceived disability. In this sample (N = 148) of self-identified chronic pain patients, the authors found that increased level of acceptance was negatively associated with perceived disability. In this same sample, Lillis *et al.* (2010) found that higher rating of perceived disability was associated with poorer sleep in pain patients.

Anxiety Sensitivity. Anxiety sensitivity is the fear of the proprioceptive cues generated by the experience of anxiety (Reiss & McNally, 1985). More specifically, it is “the fear of anxiety-related bodily sensations (e.g., fears of palpitations, dizziness, concentration difficulties), which arises from beliefs that these sensations have harmful

somatic, psychological, or social consequences” (Asmundson & Taylor, 1996, p. 578). For anxiety-sensitive individuals, there is a fear that arousal sensations created by anxiety will lead to “adverse consequences, such as death, insanity, or social rejection” (Taylor *et al.*, 2007). For example, “palpitations are feared if persons believe they will lead to cardiac arrest, dizziness or concentration difficulties are feared if individuals believe they will lead to insanity, and trembling or sweating is feared if persons believe it will elicit rejection or ridicule from others” (Asmundson & Taylor, 1996, p.578). Anxiety sensitivity is often coined “the fear of fear,” and as such serves as an anxiety amplifier (Taylor *et al.*, 2007). The more sensitive an individual to anxiety, the more fear there is of the internal cues, and thus the greater the anxiety. As a result, anxiety sensitivity may be conceptualized as a “diathesis for various types of anxiety disorders, including panic disorder, social anxiety disorder, specific phobia, and posttraumatic stress disorder” (Taylor *et al.*, 2007, p. 177).

Three factors have been found to comprise the anxiety sensitivity construct: Physical Concerns, Cognitive Concerns, and Social Concerns. Physical Concerns are associated with the belief that physical symptoms or manifestations of anxiety may lead to serious health consequences (e.g., palpitations lead to cardiac arrest). Cognitive Concerns are associated with the belief that there is something seriously wrong with one’s mind (e.g., concentration difficulties lead to insanity). Social Concerns arise out of fear of social rejection or ridicule as a result of visible symptoms of anxiety such as trembling or fainting (Taylor *et al.*, 2007, p. 177). Anxiety sensitivity differs from the associative learning that takes place when an individual learns that specific stimuli arouse fear and anxiety (called anxiety expectancy), in that anxiety sensitivity refers specifically

to the perceived consequences of that anxiety, such as illness, embarrassment, or further anxiety (Reiss & McNally, 1985; Reiss, Peterson, Gursky, & McNally, 1986). Anxiety sensitivity is also believed to play a role in the development of anxiety disorders. Reiss *et al.* (1986) found a “special relationship” (p. 7) between anxiety sensitivity and anxiety disorders in the development of the original Anxiety Sensitivity Index (ASI). The authors proposed that individuals “who believe that anxiety has terrible effects, such as heart attacks and mental illnesses, may tend to have anxiety reactions that grow in anticipation of severe consequences” (p. 7) and thus are at an increased likelihood of developing fearfulness and anxiety disorders.

In terms of chronic illnesses and studies in medical settings, previous studies examining the role of anxiety sensitivity have focused primarily on its relationship with pain. In a study of anxiety sensitivity in patients with physically unexplained chronic back pain, Asmundson and Norton (1995) examined the role of anxiety sensitivity in pain-related anxiety, fear of pain sensations, avoidance of pain, and reported disruption of life as a result of pain, such as work, social activities, and overall affect. Results from the study indicated that those with greater anxiety sensitivity reported increased pain-related anxiety, fear of negative consequences of pain, and negative affect. Of note, pain intensity among high, medium, and low anxiety sensitivity groups did not differ in this sample. Fear of pain has been shown to be a strong predictor of patient outcomes. McCracken, Zayfert, and Gross (1992) developed the Pain Anxiety Symptoms Scale (PASS) to measure somatic anxiety, cognitive anxiety, fear, and escape/avoidance in pain patients. They found that those with increased pain anxiety had increased disability and interference due to pain. Furthermore, Waddell, Newton, Henderson, Sommerville, and

Main (1993) found that fear of pain and avoidance behaviors are strongly related to disability in activities of daily living and work loss in chronic low back pain patients, and in fact were stronger predictors of disability than biomedical markers of pain, including pain intensity.

Asmundson and Taylor (1996) examined variables related to the development of fear of pain. They predicted that pain severity and anxiety sensitivity would exacerbate fear of pain, and that fear of pain would in turn lead to pain-related escape and avoidance behaviors. It was also predicted that pain severity would directly influence escape and avoidance behaviors. Results of the study indicated that pain severity did not directly influence avoidance and escape. Anxiety sensitivity, however, accounted for more than twice the variance in fear of pain than pain severity (30% versus 13%, respectively), indicating that anxiety sensitivity had a greater influence on fear of pain and ultimately avoidance and escape behaviors. Similarly, Binkley et al. (2009) examined fear and avoidance of dental care in genetic redheads. In their analyses, the authors used anxiety sensitivity as an independent variable predicting dental-care related anxiety and fear of dental pain. Results from the study indicated that, after controlling for genetic variants, gender, and trait anxiety, increased anxiety sensitivity was associated with greater fear of dental pain and, thus, avoidance of dental care.

There is growing evidence to support the role of anxiety sensitivity in the development and maintenance of the chronicity of illnesses or conditions such as pain as a result of avoidance behaviors (Asmundson, Norton, & Norton, 1999). Main (1983) found that increased bodily awareness was the most important psychological factor in the development and maintenance of chronic pain. As one avoids activities and experiences

as a result of his or her condition, a pattern of “disuse” arises (Bortz, 1984) which in turn may lead to increased perceived disability as a result of “physical deconditioning, dysphoric affect, and preoccupation with somatic symptoms” (Asmundson, Norton, & Norton, 1999). In a study of 259 chronic pain patients, Asmundson and Taylor (1996) tested their predictions that anxiety sensitivity caused fear of pain and, thus, pain-related avoidance (i.e., disuse; Figure 1). Results from the study revealed that, controlling for pain intensity, anxiety sensitivity caused fear of pain, which in turn led to avoidance, such as stopping activities when individual began to feel pain, use of analgesic medication, and altering one’s life as a result of pain.

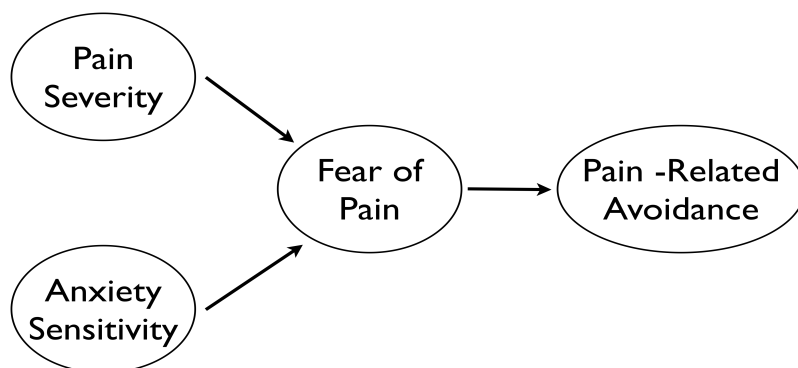


Figure 1. Model of Anxiety Sensitivity, Fear of Pain, and Pain-Related Avoidance/Escape Behaviors

Acceptance. The construct of acceptance has an emerging base of support in the literature in terms of clinical utility and its relationship to functional outcomes – especially in the context of Acceptance and Commitment Therapy. Hayes (1994) defined acceptance as “experiencing events fully and without defense, as they are” (p. 30). In other words, acceptance of symptoms related to a chronic illness can be defined as living with one’s symptom without judgment or attempts to reduce or avoid them. Recently,

acceptance in the chronic pain literature has been conceptualized as consisting of two factors: activity engagement and pain willingness (McCracken, Vowles, & Eccleston, 2004). Activity engagement is defined as “pursuit of life activities regardless of pain,” while pain willingness refers to a “recognition that avoidance and control are often unworkable methods of adapting to chronic pain” (McCracken *et al.*, 2004). This two factor structure has recently been confirmed by Beacham, Kinman, Herbst and Linfield (2013) in a broader sample, inclusive of varied and multiple chronic illnesses, including but not limited to chronic pain.

The construct of acceptance has its origins in experiential avoidance. Experiential avoidance is “the phenomenon that occurs when a person is unwilling to remain in contact with particular private experiences (e.g., bodily sensations, emotions, thoughts, memories, behavioral predispositions) and takes steps to alter the form or frequency of these events and the contexts that occasion them” (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996, p. 1155). In other words, experiential avoidance is conceptually opposite to the construct of acceptance. Acceptance is a foundation of Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1990), Mindfulness-Based Cognitive Therapy (MBCT; Teasdale, Segal, & Williams, 1995), Dialectical Behavior Therapy (DBT; Linehan, 1993), Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999), and Relapse Prevention (RP; Marlatt & Gordon, 1985), and has been used to treat chronic pain, cancer, eating disorders, depression, anxiety, and bipolar, among others [see Baer (2003) for a review].

Acceptance has been studied in recent literature as applied to chronic pain patient populations. Clinical studies have identified chronic pain acceptance as a key construct

in the experience of chronic pain and a reliable predictor of patient outcome (e.g., McCracken & Eccleston, 2003; McCracken, Vowles, & Eccleston, 2004; Vowles, McCracken, & Eccleston, 2008). Chronic pain acceptance is defined as “living with pain without reaction, disapproval, or attempts to reduce or avoid it” (McCracken & Eccleston, 2003, p.198). This differs fundamentally from the notion of *coping* with pain, which can be defined as “the effortful (i.e., non-automatic) attempt to adapt to pain, or manage one’s own negative response to pain” (McCracken & Eccleston, 2003, p. 197). McCracken and Eccleston (2003) examined the differential effects of coping versus acceptance in a sample of 230 consecutive pain patients in a university pain management center, and found that overall acceptance accounted for twice as much variance as coping in terms of pain, disability, work status, depression, and pain-related anxiety outcome measures.

Acceptance of pain has been associated with lower ratings of pain intensity, higher overall patient function, and lower levels of perceived disability (McCracken & Eccleston, 2003). In a Swedish trial of ACT for individuals at risk for long-term disability due to pain and stress, Dahl, Wilson, and Nilsson (2004) randomized 19 participants to either an ACT or treatment as usual group. At 6-month follow-up, those in the ACT group had fewer sick days and showed decreased healthcare utilization. McCracken, Vowles, and Eccleston (2005) found significant improvements in a number of outcome measures, including improved social, emotional, and physical functioning, and decreased healthcare utilization when analyzing the effects of an acceptance-based treatment program for chronic pain. Improved patient outcomes continued at 3-month follow-up and were correlated with increased endorsement of chronic pain acceptance.

Acceptance and patient outcomes. Chronic pain acceptance is most often measured using the Chronic Pain Acceptance Questionnaire (CPAQ; McCracken, Vowles, & Eccleston, 2004). The measure was originally adapted by Geiser (1992) from the Acceptance and Action Questionnaire (AAQ; Hayes *et al.*, 1993), which was developed to measure experiential avoidance. In a component analysis of the original 34-item version of the CPAQ, McCracken, Vowles, and Eccleston (2004) found the measure to be multidimensional, with two factors: “(1) activity engagement (pursuit of life activities regardless of pain); (2) pain willingness (recognition that avoidance and control are often unworkable methods of adapting to chronic pain); (3) thought control (belief that pain can be controlled or changed by altering one’s thoughts); and (4) chronicity (recognizing that pain may not change)” (p.161). Upon further review, however, several items were eliminated due to lack of empirical basis, lack of mention of pain, or for having skewed distributions (e.g., greater than half of respondents endorsing the same rating). Further, the thought control and chronicity factors had marginal reliabilities and were unrelated to other measures of pain, and thus were excluded from the final solution. As a result, the final measure retained 20 items and the activity engagement and pain willingness factors.

Activity engagement and pain willingness are both significantly, and negatively, related to measures of pain intensity, healthcare utilization (including medical visits and pain medications), daytime rest, physical disability, depression, pain-related anxiety, and psychosocial disability, as well as positively related to work status. The activity engagement factor includes items such as “I am getting on with the business of living no matter what my level of pain is,” “There are many activities I do when I feel pain,” and “I

lead a full life even though I have chronic pain.” The pain willingness factor is made up of items such as “I would gladly sacrifice important things in my life to control this pain better,” “I need to concentrate on getting rid of my pain,” and “My worries and fears about what pain will do to me are true.” Scores from the two factors combine to give an overall measure of acceptance.

Increased levels of acceptance have been related to increased positive affect in chronic pain patients, as well as functioning as a moderator of pain and negative affect (Kratz, Davis, & Zautra, 2007). Additionally, acceptance has been found to mediate a number of pain related variables and patient outcomes. Vowles, McCracken, and Eccleston (2008) examined the role of acceptance in the relationship between pain catastrophizing and pain intensity, depression, pain anxiety, physical disability, psychosocial disability, and measures of motor function. Prior to this study, it had been widely accepted that catastrophic thinking related to one’s pain was related to elevated levels of distress and disability (Vowles *et al.*, 2008). Participants in this study were 334 chronic pain patients entering specialty pain treatment in a multidisciplinary setting. Acceptance was found to mediate the relationship between pain catastrophizing and depression, anxiety, avoidance, and physical and psychosocial functioning. In other words, inclusion of acceptance in regression analyses significantly attenuated the negative effect of catastrophizing on multiple outcome measures, indicating that acceptance may be an important construct in the understanding and treatment of chronic pain.

In a sample of self-identified chronic pain patients (N = 300) recruited from online chronic pain support groups, Herbst, Kinman, Payne-Murphy, Brown, and

Beacham (2011) examined the role of total acceptance (as measured by CPAQ total score), as well as activity engagement and pain willingness scores, in the relationship between anxiety sensitivity and perceived disability. An anxiety sensitivity total score from the Anxiety Sensitivity Index was examined. The results of the study suggested that chronic pain acceptance serves as a formidable mediator in the relationship between Anxiety Sensitivity and Perceived Disability. Inclusion of chronic pain acceptance rendered all regression standardized Beta weights non-significant (p 's = .262 - .918). Simply stated, while there may have appeared to be a direct relationship between anxiety sensitivity and perceived disability [consistent with previous research (Asmundson & Norton, 1995)], increased anxiety sensitivity in fact predicted decreased chronic pain acceptance, which in turn predicted increased levels of perceived disability. When examined more closely, the results of these analyses suggested that both components of chronic pain acceptance – activity engagement and pain willingness – likewise mediated this relationship. These results imply that a person's *willingness* to experience aversive symptoms and *engagement* in valued life activities may supersede the relationship between fear of bodily sensations and Perceived Disability in common life domains.

In a replication and extension of this study, Herbst, Payne-Murphy, and Beacham (2013) examined the role of chronic *illness* acceptance in participants in online chronic illness support groups. Notably, participants in these groups endorsed having myriad chronic illnesses and typically with co-morbid diagnoses with the average number of chronic illnesses being over two (Mean = 2.3). This study extended upon the previously described study by analyzing the utility of chronic illness acceptance (as measured by the Chronic Illness Acceptance Questionnaire), a broader construct intended for individuals

with any (and co-morbid) chronic illness, as it relates to chronic pain patients. Those who indicated that they had chronic pain as one of their chronic illnesses were included in the final sample ($N = 236$). Five of the seven tests of mediation were significant, rendering previously significant Standardized Beta weights non-significant ($p = .070 - .417$). Follow-up Sobel test were conducted to test for strength of mediation. Sobel test statistics ranged from $1.89 - 3.14$ ($p = .003-.030$). Results from this study were consistent with the previous study, indicating that chronic illness acceptance, including willingness and activity engagement, strongly mediated the relationship between anxiety sensitivity and perceived disability in chronic pain patients.

Utility of a broad measure of chronic illness acceptance. Although acceptance has been studied with chronic pain patients, its role in the experience of other chronic conditions (such as diabetes, cardiovascular disease, and asthma), as well as functional outcomes for patients suffering from those myriad conditions, is less clear. Interventions for chronic conditions using therapies with an acceptance component have shown promising results. In an example of one such study, Reibel, Greeson, Brainard, and Rosenzweig (2001) examined the effects of an MBSR intervention on a number of outcome variables with a heterogeneous patient population. The most common conditions were chronic pain, hypertension, anxiety/panic, depression, cancer, and asthma. The program resulted in a significant improvement of health-related quality of life, including increased vitality, decreased pain, decreased role limitations, and increased social functioning; a 28% reduction of physical symptoms; and a significant decrease in psychological distress. Given the success of programs such as this, which target patients

who have multiple chronic illnesses, it may be argued that assessments and interventions focused on singular disorders are limited in scope and clinical utility.

In the United States alone, over 60 million people have multiple chronic illnesses (Wu & Green, 2000). Grumbach (2003) notes that most patients with chronic illnesses do not have a single, predominant condition. Rather, most have comorbidity, the simultaneous presence of multiple chronic conditions (Grumbach, 2003, p. 5). Accordingly, studying the impact that chronic illnesses have as a whole may be more appropriate than studying acceptance as it relates to individual illnesses or a specific related symptom.

Purpose of the Study

The purpose of this study was to broaden the scope of acceptance to include chronic illness in general, not solely chronic pain. This study attempted to replicate and extend upon previous studies which have identified acceptance as a key construct in the understanding of the experience of chronic pain as well as a significant predictor of patient outcome, to include a heterogeneous sample of chronic illness sufferers, as was demonstrated in a previous study examining chronic pain acceptance (Herbst, Kinman, Payne-Murphy, Brown, & Beacham, 2011).

In accordance with the Barron and Kenny (1986) procedures for the test of mediation the following four hypotheses were tested:

- 1) Anxiety sensitivity (and individual subscales physical, cognitive, and social concerns) predicts perceived disability;

2) Anxiety sensitivity (and individual subscales physical, cognitive, and social concerns) predicts chronic illness acceptance, activity engagement, and illness willingness;

3) Chronic illness acceptance (and individual subscales activity engagement and illness willingness), predicts perceived disability; and, finally

4) Chronic illness acceptance, activity engagement, and illness willingness mediate the relationship between anxiety sensitivity (and individual subscales physical, cognitive, and social concerns) and perceived disability.

See also Figures 3-9 illustrating these hypotheses.

CHAPTER III

METHODS

Participants

Data for this study were archival. Study participants were recruited through online chronic illness support groups. In order to be eligible to participate in the original study, participants must: a) have been a member of a *Yahoo!* Internet-based chronic illness support group; b) have a chronic health condition lasting at least three months; and c) have been at least 18 years old at time of survey completion. The groups targeted were those which the stated mission was to offer support for persons who self-identify as having been diagnosed with a chronic illness (e.g., diabetes, CVD, COPD, Fibromyalgia) or symptoms (e.g., pain such as chronic pelvic pain). The following types of groups were excluded from participation: a) 12-step programs; b) biofeedback; c) intervention-based; d) spiritually-oriented; e) medication-focused; and e) litigious. Study participants completed an online survey through SurveyMonkey that included demographic and medical history questions and a series of self-report questionnaires. A total of 584 participants agreed to participate in the original study and completed at least a portion of the survey. Those who completed at least 90% of the survey were eligible to enter a lottery for a \$50 cash card.

Measures

Demographics. Participants provided demographic data, including age, gender, ethnicity, income, type and number of chronic illnesses, length of time since diagnosis, and presence and location of chronic pain.

Chronic Illness Acceptance Questionnaire. The Chronic Illness Acceptance Questionnaire (CIAQ; Beacham, Kinman, & Herbst, 2012; Appendix A) was adapted from the Chronic Pain Acceptance Questionnaire (CPAQ). The CPAQ assesses acceptance of pain and was originally derived from the Acceptance and Action Questionnaire (AAQ; Hayes *et al.*, 2004). Twenty items are rated on a 0 (“*Never true*”) to 6 (“*Always true*”) scale to produce a two-factor structure: Activity Engagement and Pain Willingness (McCracken *et al.*, 2004). All CPAQ items were retained in the development of the CIAQ. The factor structure of the CIAQ is currently being tested, but preliminary analyses revealed that corresponding items on the CIAQ from the CPAQ Activity Engagement and Willingness factors had adequate psychometric properties (Chronbach’s Alpha = .88 and .75, respectively). Overall, results showed adequate-to-good fit to the data. Several fit indices were applied to evaluate the adequacy of model fit. Consistent with Vowles *et al* (2008) we applied the metric of observed chi square less than twice the degrees of freedom (Chi -square = 563, df = 169, $p < .0005$) which in this sample was 3.33. Additionally, the Goodness of Fit Index (GFI) = .857, Adjusted Goodness of Fit Index (AGFI) = .823 which adjusts for sample size, Comparative Fit Index (CFI) = .84 and Root Mean Square Error of Approximation (RMSEA) = .080. [90% C.I. = .061 - .073] which indicates a reasonable fit. Preliminary analyses of the CIAQ also demonstrate that the measure has significant relationships with key predictors of patient outcome, including perceived disability, positive and negative affectivity, anxiety sensitivity, experiential avoidance, and mindfulness (Beacham, Kinman, and Herbst, 2012).

Anxiety Sensitivity Index-III. The Anxiety Sensitivity Index-III (ASI-III; Appendix B) is an 18-item self-report measure of Anxiety Sensitivity. Items are rated on a 1 (“*Very little*”) to 5 (“*Very much*”) scale. The measure is multidimensional, with Physical Concerns, Cognitive Concerns, and Social Concerns factors loading onto a single higher order factor, Global Anxiety Sensitivity (Taylor *et al.*, 2007). The ASI-III was developed from the original, unidimensional Anxiety Sensitivity Index (Peterson & Reiss, 1992).

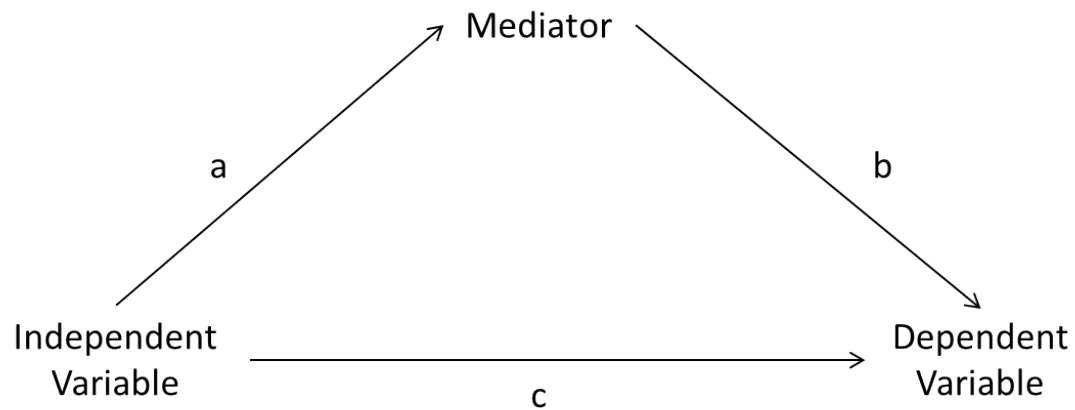
Perceived Illness Disability Index. The Perceived Illness Disability Index (PIDI; Appendix C) was adapted from the Pain Disability Index to make it inclusive of all chronic conditions, not just pain. To achieve this, instructions were changed from “... disrupted by your pain” to “...disrupted by your chronic illness.” Self-reported illness interference is assessed in the following life domains: family/home responsibilities, recreation, social activities, occupation, sexual behavior, self-care, and life-support activity. Items are rated on a 0 (“No disability”) to 10 (“Total disability”) scale (Pollard, 1984). The seven items are summed to create a single total disability score.

Study Analyses

According to Baron and Kenny (1986), “a variable may be said to function as a mediator to the extent that it accounts for the relation between the predictor and the criterion,” in this case Anxiety Sensitivity and Perceived Disability, respectively (p. 1176). A mediating relationship among variables is said to exist when: a. the independent variable significantly predicts the proposed mediator variable; b. the mediator variable significantly predicts the dependent variable; and c. when controlling for the effects of the mediator variable, the previously significant relationship between

the independent variable and dependent variable is no longer significant (see Figure 1). Perfect mediation is said to exist when inclusion of the mediator results in zero effect on the dependent variable by the independent variable (i.e., inclusion of a third variable eliminates all relationship between the independent and dependent variables). However, as most variables of interest are considered to have multiple causes, a more realistic expectation may be the *attenuation* of the relationship between the independent and dependent variables to non-significance, rather than complete elimination (Baron & Kenny, 1986).

According to Fiske, Kenny, and Taylor (1982), “analysis of variance does not establish a link between the mediator and dependent variable” (Path b in Figure 2; p. 109), as ANOVA only tests the effect of the independent variable on the mediator and dependent variables (Paths a and c in Figure 2). Due to the limitations of using ANOVA to test for mediation, it has been proposed that a series of regression equations be estimated (Judd & Kenny, 1981). Specifically, to test for mediation, the following regression equations are estimated: 1. the mediator is regressed on the independent variable (Path a); 2. the dependent variable is regressed on the independent variable (Path c); and 3. the dependent variable is regressed on both the independent and mediator variables (Path b; Baron & Kenny, 1986).



From Baron & Kenny, 1986.

Figure 2. Model of Mediation

Consistent with the Baron and Kenny (1986) approach, the following regression equations were estimated:

1. CIAQ Total Score and ASI Total Score (Figure 3)
 - a. CIAQ Total Score was regressed on the ASI Total Score
 - b. PIDI Total Score was regressed on the CIAQ Total Score
 - c. PIDI Total Score was regressed on the ASI Total Score
 - c'. PIDI Total Score was regressed on both ASI Total Score and CIAQ Total Score

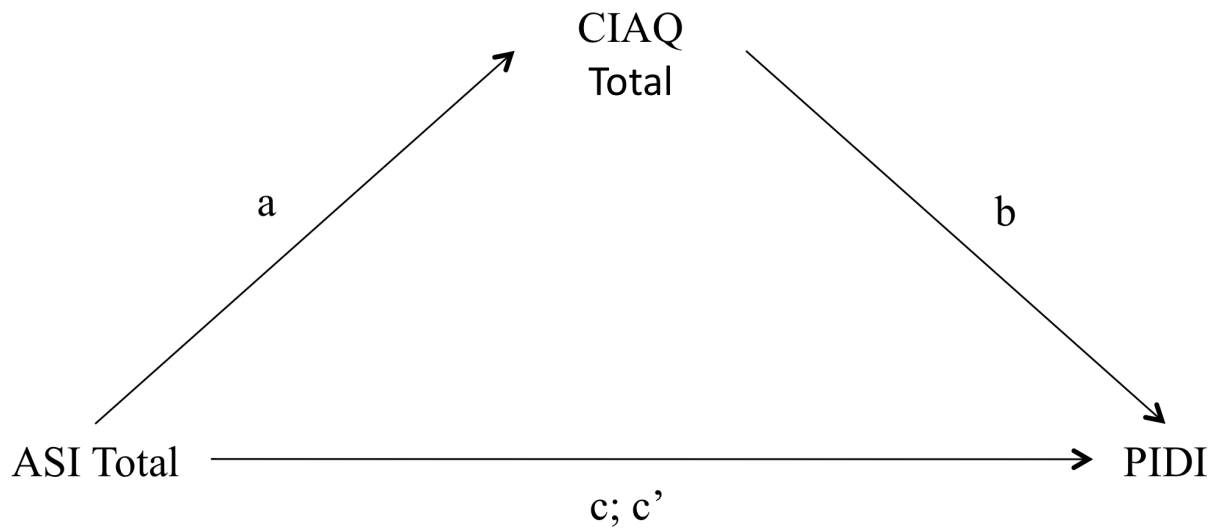


Figure 3. Proposed Model of Regression Equation Estimation for CIAQ Total Score and ASI Total Score Test of Mediation

2. CIAQ Activity Engagement and ASI Physical Concerns (Figure 4)

- a. CIAQ Activity Engagement was regressed on the ASI Physical Concerns
- b. PIDI Total Score was regressed on the CIAQ Activity Engagement
- c. PIDI Total Score was regressed on the ASI Physical Concerns
- c'. PIDI Total Score was regressed on both ASI Physical Concerns and CIAQ Activity Engagement

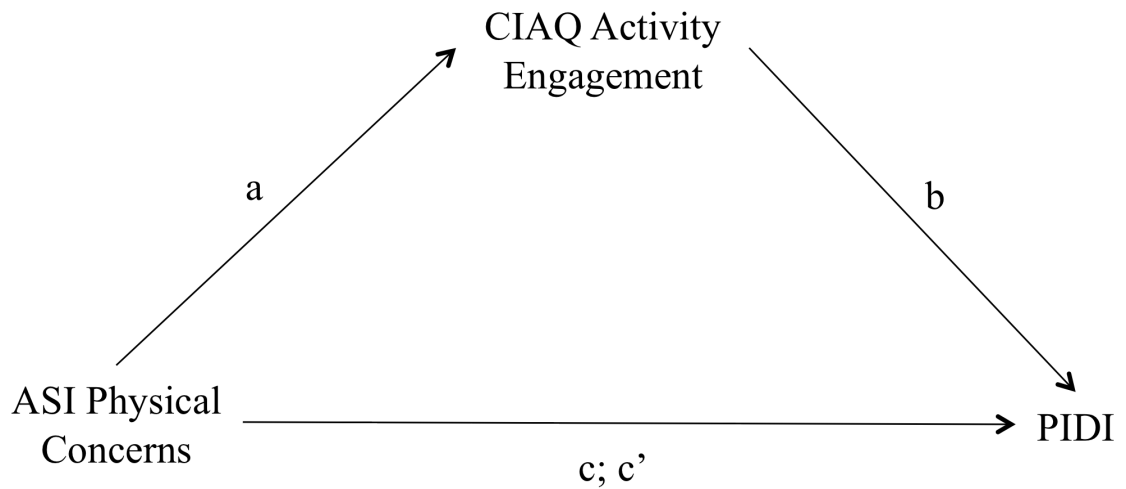


Figure 4. Proposed Model of Regression Equation Estimation for CIAQ Activity Engagement and ASI Physical Concerns Test of Mediation

3. CIAQ Activity Engagement and ASI Cognitive Concerns (Figure 5)

- a. CIAQ Activity Engagement was regressed on the ASI Cognitive Concerns
- b. PIDI Total Score was regressed on the CIAQ Activity Engagement
- c. PIDI Total Score was regressed on the ASI Cognitive Concerns
- c'. PIDI Total Score was regressed on both ASI Cognitive Concerns and CIAQ Activity Engagement

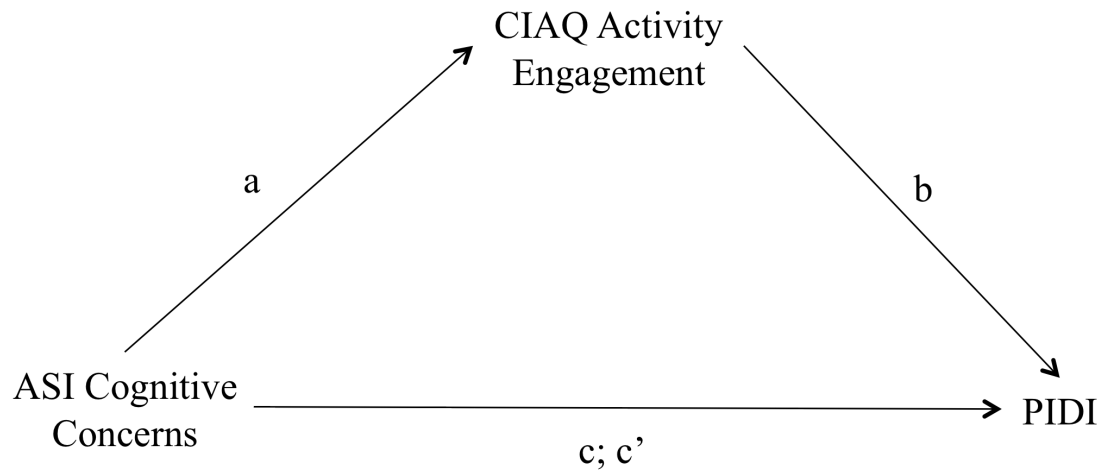


Figure 5. Proposed Model of Regression Equation Estimation for CIAQ Activity Engagement and ASI Cognitive Concerns Test of Mediation

4. CIAQ Activity Engagement and ASI Social Concerns (Figure 6)

- a. CIAQ Activity Engagement was regressed on the ASI Social Concerns
- b. PIDI Total Score was regressed on the CIAQ Activity Engagement
- c. PIDI Total Score was regressed on the ASI Social Concerns
- c'. PIDI Total Score was regressed on both ASI Social Concerns and CIAQ Activity Engagement

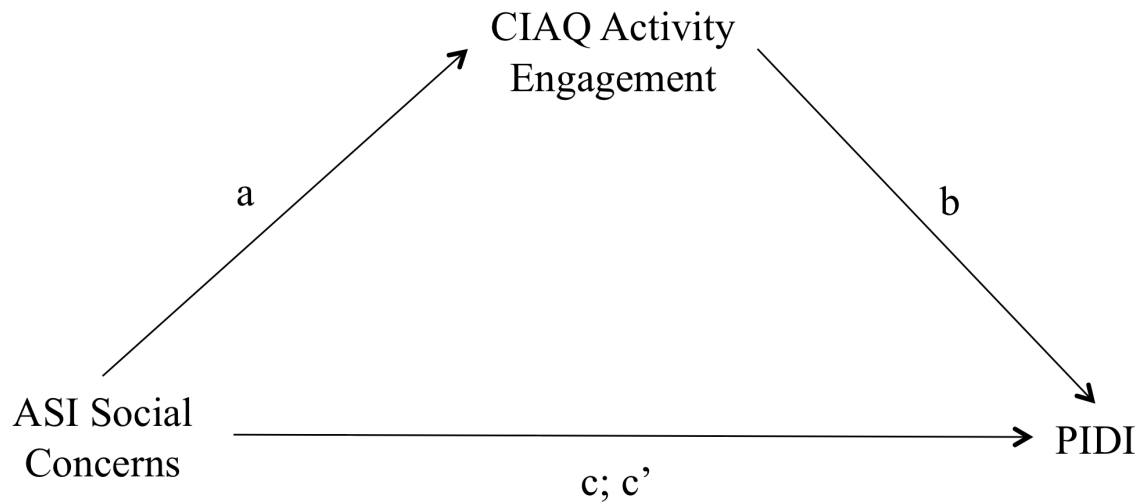


Figure 6. Proposed Model of Regression Equation Estimation for CIAQ Activity Engagement and ASI Social Concerns Test of Mediation

5. CIAQ Illness Willingness and ASI Physical Concerns (Figure 7)

- a. CIAQ Illness Willingness was regressed on the ASI Physical Concerns
- b. PIDI Total Score was regressed on the CIAQ Illness Willingness
- c. PIDI Total Score was regressed on the ASI Physical Concerns
- c'. PIDI Total Score was regressed on both ASI Physical Concerns and CIAQ Illness Willingness

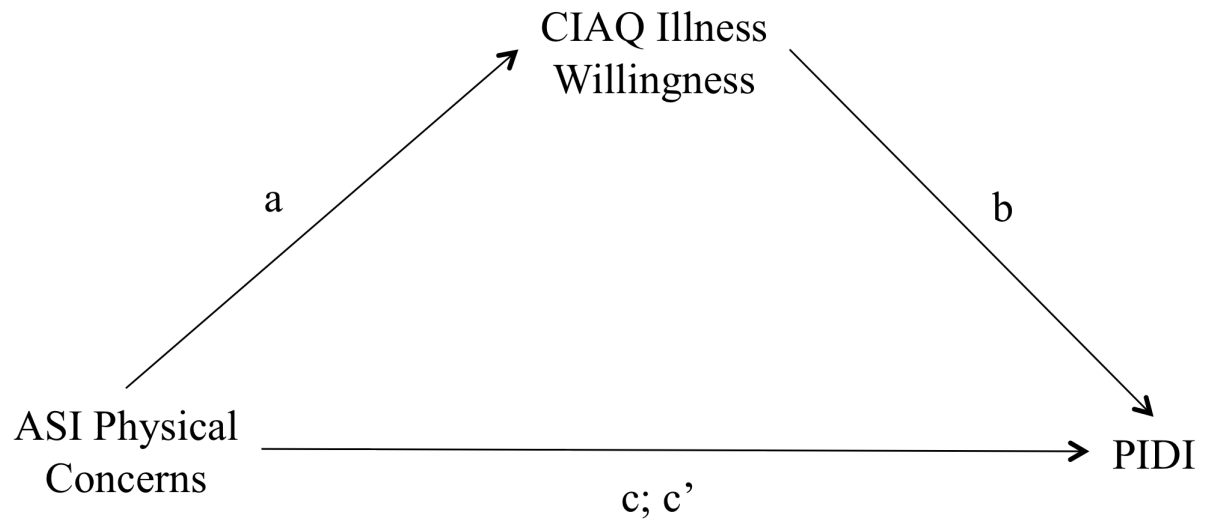


Figure 7. Proposed Model of Regression Equation Estimation for CIAQ Illness Willingness and ASI Physical Concerns Test of Mediation

6. CIAQ Illness Willingness and ASI Cognitive Concerns (Figure 8)

- a. CIAQ Illness Willingness was regressed on the ASI Cognitive Concerns
- b. PIDI Total Score was regressed on the CIAQ Illness Willingness
- c. PIDI Total Score was regressed on the ASI Cognitive Concerns
- c'. PIDI Total Score was regressed on both ASI Cognitive Concerns and CIAQ Illness Willingness

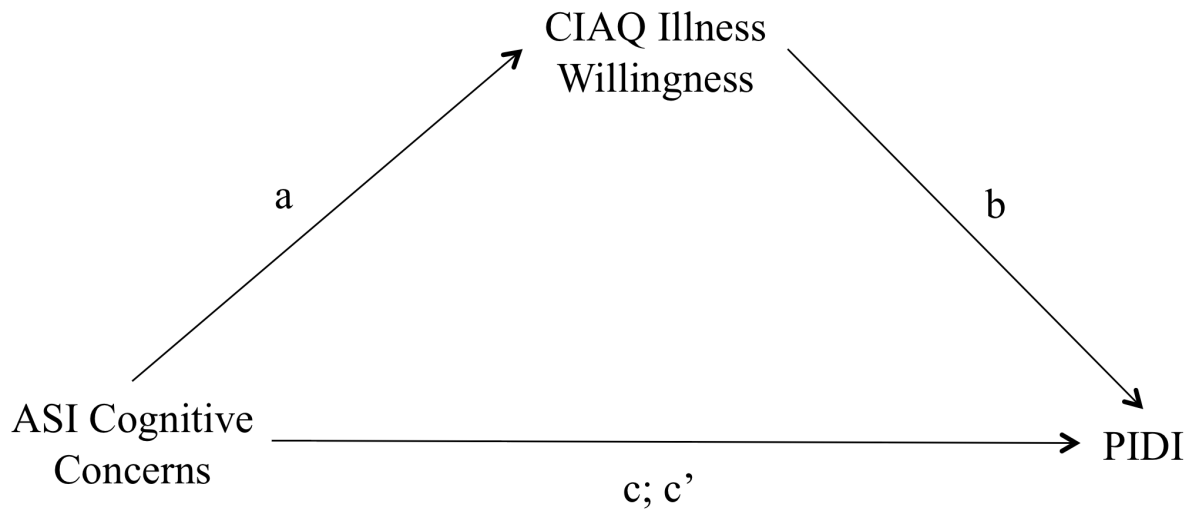


Figure 8. Proposed Model of Regression Equation Estimation for CIAQ Illness Willingness and ASI Cognitive Concerns Test of Mediation

7. CIAQ Illness Willingness and ASI Social Concerns (Figure 9)

- a. CIAQ Illness Willingness was regressed on the ASI Social Concerns
- b. PIDI Total Score was regressed on the CIAQ Illness Willingness
- c. PIDI Total Score was regressed on the ASI Social Concerns
- c'. PIDI Total Score was regressed on both ASI Social Concerns and CIAQ Illness Willingness

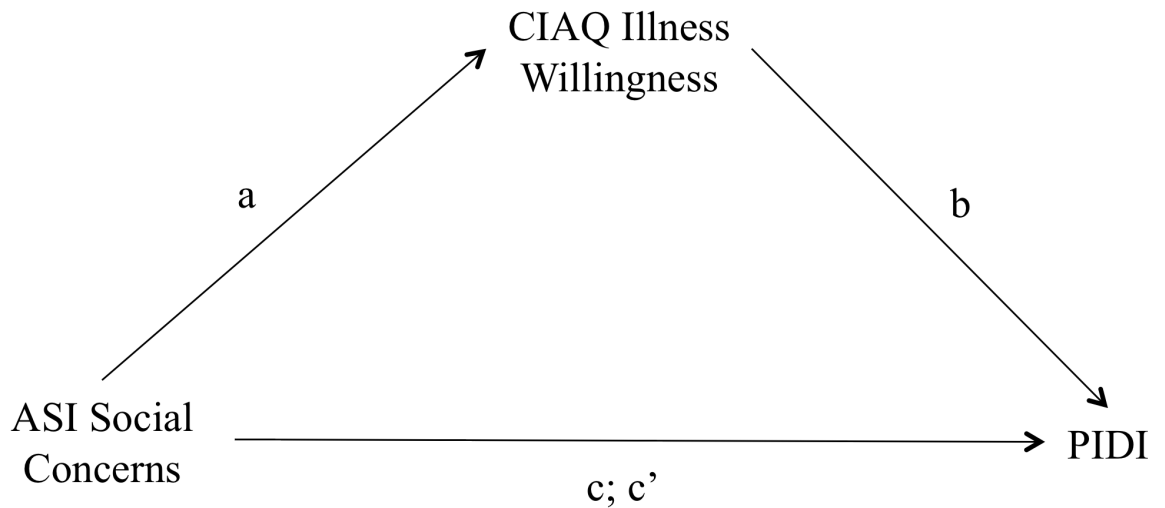


Figure 9. Proposed Model of Regression Equation Estimation for CIAQ Illness Willingness and ASI Social Concerns Test of Mediation

Examination of Indirect Effects. Given the role of the mediator in accounting, at least partially, for the relationship between the independent and dependent variables, the dependent variable and mediator should be correlated. Due to this correlation, there arises an issue of multicollinearity and hence reduced power (Baron & Kenny, 1986). It is thus necessary to examine the size of the indirect effect (i.e., the “amount” of mediation) of the independent variable on the dependent variable by the mediator (Baron & Kenny, 1986). The Sobel test (Sobel, 1982) provides a measure of the amount, or strength, of mediation by analyzing the standard errors of the independent variable-mediator and mediator-dependent variable regression equations. A simulation study by MacKinnon, Warsi, and Dwyer (1995) found the Sobel test to be very conservative.

A less conservative but increasingly popular test for strength of mediation is bootstrapping. Bootstrapping is a procedure in which resampling with replacement is

conducted numerous (e.g., 1000 or more) times (Bollen & Dineen, 1990). Bootstrapping has been shown to be a robust test for indirect effects in the presence of nonnormal data (Pituch & Stapleton, 2008), and thus is often used in conjunction with the Sobel test when the normality assumption has not been met. Sobel tests were conducted in this study to determine the strength of mediation. The Sobel test is given as a z-statistic which provides the standard error of Paths a and b (see Figure 2), and is calculated by taking the square root of $b^2 s_a^2 + a^2 s_b^2$, where a^2 equals the regression coefficient from Path a, b^2 equals the regression coefficient from Path b, s_a^2 is the standard error of a, and s_b^2 is the standard error of b (Sobel, 1982; Baron & Kenny, 1986).

CHAPTER IV

RESULTS

Sample Characteristics

For the current study, only participants who completed all items of the Chronic Illness Acceptance Questionnaire, the Anxiety Sensitivity Index-III, and the Perceived Illness Disability Index were included, yielding a final sample of $N = 292$ (see Table 1 for demographic characteristics). The mean age of the participants was 52.26 years ($SD = 12.34$). 82.1% of the sample was female ($n = 239$). The sample was primarily Caucasian (92.1%; $n = 268$) and married/partnered (66.3%; $n = 193$). The median household income was between \$40,000 and \$50,000. Mean years of education was 15.37 ($SD = 2.82$).

Table 1

Sample Demographic Characteristics

	Mean (SD)	n (%)
Age	52.26 (12.34)	
Income (median)	\$40,000-\$50,000	
Education	15.37 (2.82)	
Gender		
Female		239 (82.1)
Male		52 (17.9)
Ethnicity		
Caucasian		268 (92.1)
African American		7 (2.4)
American Indian		4 (1.4)
Hispanic		3 (1.0)
Asian		3 (1.0)
Other		6 (2.1)
Marital status		
Married/partnered		193 (66.3)
Divorced		42 (14.4)
Single		35 (12.0)
Widowed		13 (4.5)
Separated		8 (2.7)

Participants were instructed to select all chronic illness diagnoses that applied to them (Table 2). Most commonly endorsed diagnoses were hypertension (n = 82), asthma (n = 68), diabetes (n = 52), and chronic obstructive pulmonary disease (COPD; n = 52). Mean number of chronic illnesses was 2.72 (SD = 1.59).

Table 2

Endorsed Chronic Illness Diagnoses

Diagnosis	n (%)
Hypertension	82 (28.10)
Asthma	68 (23.30)
Diabetes	52 (17.81)
COPD	52 (17.81)
Multiple sclerosis	35 (11.99)
Heart disease	32 (10.96)
Chronic fatigue syndrome	22 (7.53)
Relapsing polychondritis	11 (3.77)
Wegener's granulomatosis	11 (3.77)
Antiphospholipid syndrome	7 (2.40)
Lyme disease	6 (2.05)
Irritable bowel syndrome	4 (1.37)
Lupus	3 (1.03)

The presence of chronic pain was identified with two independent survey items. In the study sample, 54.1% of participants (n = 134) endorsed having a chronic pain diagnosis, while 72.9% (n = 213) indicated that chronic unremitting or recurring pain was a “primary concern.” The most common chronic pain diagnoses were arthritis (n = 120) and fibromyalgia (n = 51). The most common locations of pain were lower limbs (n = 157), upper extremities (n = 141), lower back (n = 125), cervical spine (n = 116), and full-body (n = 85). Mean length of time with chronic pain was 13.85 years (SD = 11.01), and mean pain intensity at time of survey completion was 4.97/10 (SD = 2.12).

Analyses of Primary Hypotheses

The data were analyzed for univariate normality of distributions using skewness and kurtosis (Table 3). The Chronic Illness Acceptance Questionnaire and the Perceived Illness Disability Index were determined to be normally distributed. The Anxiety Sensitivity Index, however, violated the assumption of univariate normality.

Table 3

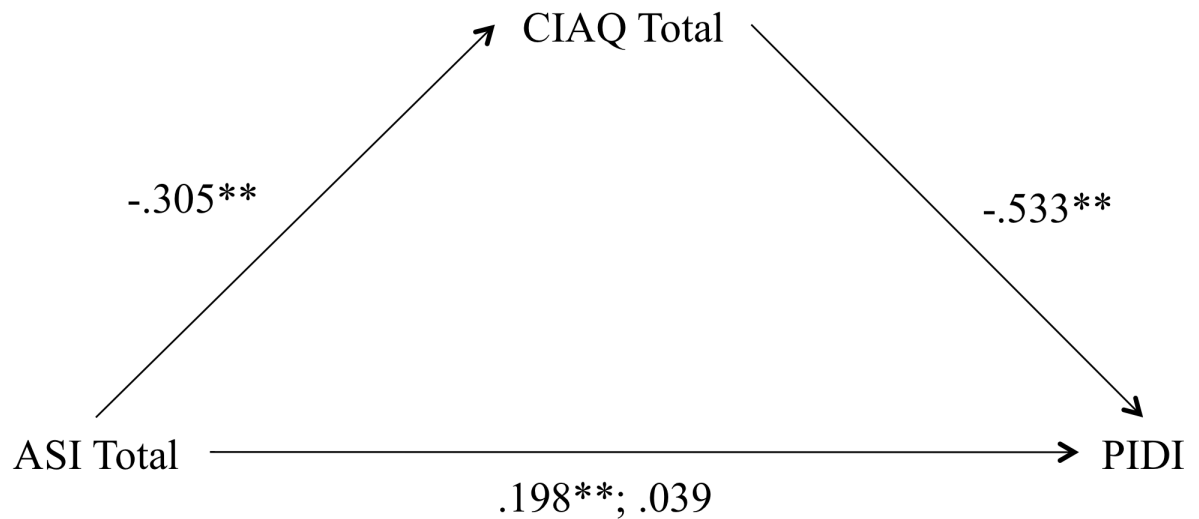
Means, Standard Deviations, and Tests of Univariate Normality for Observed Variables Included in Mediation Analyses

Observed Variable	Mean	SD	Skewness (SE)	Kurtosis (SE)
Chronic Illness Acceptance	58.76	16.77	.266 (.143)	-.067 (.284)
Activity Engagement	35.09	12.07	.000 (.143)	-.378 (.284)
Illness Willingness	23.67	8.51	.287 (.143)	.227 (.284)
Anxiety Sensitivity	18.36	12.97	1.181 (.143)	1.205 (.284)
Physical Concerns	6.46	5.22	.837 (.143)	.014 (.284)
Cognitive Concerns	4.72	5.44	1.511 (.143)	1.692 (.284)
Social Concerns	7.18	5.03	.922 (.143)	.662 (.284)
Perceived Illness Disability	35.83	15.83	-.280 (.143)	-.703 (.284)

Given that a relatively high number of linear regressions were performed to test for the mediating effect of acceptance in the relationship between anxiety sensitivity and perceived illness disability, there is an increased probability of committing Type I/Alpha or “experiment wise” error. To control for this potential effect, a Bonferroni correction was conducted by dividing the alpha .05 by 21 (the number of unique linear regressions in the analyses). This yields a new criterion alpha of $p < .0025$. In other words, linear regressions with a p -value of .0025 or greater were considered non-significant, as opposed to the most commonly applied standard criterion of $p < .05$.

Analyses of mediation were conducted according to the method proposed by Baron and Kenny (1986; see above). In total, there were seven sets of linear regressions

testing for the mediating effect of acceptance in the relationship between anxiety sensitivity and perceived disability (Figures 3-9). In the first model, linear regression equations were estimated to test for the mediating effect of Chronic Illness Acceptance Total Score on the relationship between Anxiety Sensitivity Total Score and Perceived Illness Disability (Figure 10). First, the mediator variable, Chronic Illness Acceptance Total Score, was regressed onto the predictor Variable, Anxiety Sensitivity Total Score ($r^2 = .151, p < .001$). Next, the criterion variable, Perceived Illness Disability, was regressed onto Chronic Illness Acceptance Total Score ($r^2 = .286, p \leq .001$). Then Perceived Illness Disability was regressed Anxiety Sensitivity Total Score ($r^2 = .057, p = .001$). Finally, Perceived Illness Disability was regressed onto both Anxiety Sensitivity Total Score and Chronic Illness Acceptance Total Score. Inclusion of Acceptance reduced the standardized beta coefficient between Anxiety Sensitivity Total Score and Perceived Illness Disability from .198 to .039 ($p = .473$). A Sobel test was then conducted to determine the significance of mediation ($Z = 4.79, p \leq .001$; Table 4).

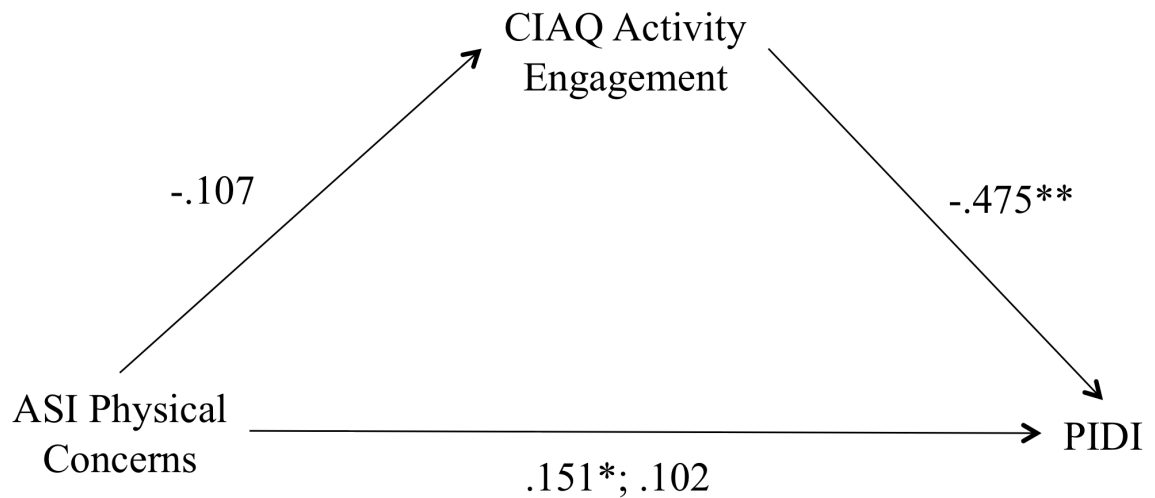


* $p < .05$; ** $p < .0025$ (Bonferroni correction).

Figure 10. Standardized Coefficients (beta) Derived Using Linear Regression Testing for the Mediating Effect of Chronic Illness Acceptance Total Score in the Relationship between Anxiety Sensitivity Total Score and Perceived Illness Disability Score

In the second model, linear regressions were conducted to determine the mediating effect of Chronic Pain Acceptance – Activity Engagement on the relationship between Anxiety Sensitivity – Physical Concerns and Perceived Illness Disability (Figure 11). First, Activity Engagement was regressed onto Physical Concerns ($r^2 = .056$, $p = .071$). Next, Perceived Illness Disability was regressed onto Activity Engagement ($r^2 = .234$, $p < .001$). Then Perceived Illness Disability was regressed onto Physical Concerns ($r^2 = .041$, $p = .011$). Finally, Perceived Illness Disability was regressed onto both Physical Concerns and Activity Engagement. Inclusion of Activity Engagement reduced the standardized beta weight between Physical Concerns and Perceived Illness Disability from .151 to .102 ($p = .056$). A Sobel test was conducted to test the indirect effect (i.e., strength) of mediation for Chronic Illness Acceptance Total Score mediating the

relationship between Anxiety Sensitivity Total Score and Perceived Illness Disability. A Sobel test was then conducted to determine the significance of mediation ($Z = 1.78, p = .07$; Table 4).

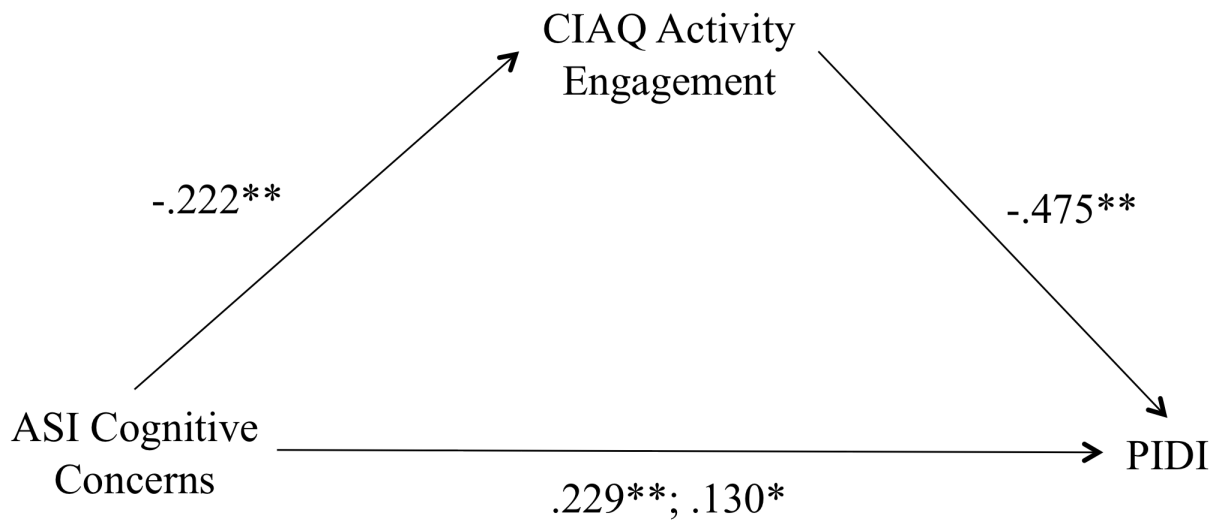


* $p < .05$; ** $p < .0025$ (Bonferroni correction).

Figure 11. Standardized Coefficients (beta) Derived Using Linear Regression Testing for the Mediating Effect of Chronic Illness Acceptance – Activity Engagement in the Relationship between Anxiety Sensitivity – Physical Concerns and Perceived Illness Disability Score

In the third model, linear regressions were conducted to determine the mediating effect of Chronic Pain Acceptance – Activity Engagement on the relationship between Anxiety Sensitivity – Cognitive Concerns and Perceived Illness Disability (Figure 12). First, Activity Engagement was regressed onto Cognitive Concerns ($r^2 = .093, p < .001$). Next, Perceived Illness Disability was regressed onto Activity Engagement ($r^2 = .234, p < .001$). Then Perceived Illness Disability was regressed onto Cognitive Concerns ($r^2 = .070, p < .001$). Finally, Perceived Illness Disability was regressed onto both Cognitive

Concerns and Activity Engagement. Inclusion of Activity Engagement reduced the standardized beta weight between Cognitive Concerns and Perceived Illness Disability from .229 to .130 ($p = .017$). A Sobel test was then conducted to determine the significance of mediation ($Z = 3.52, p \leq .001$; Table 4).

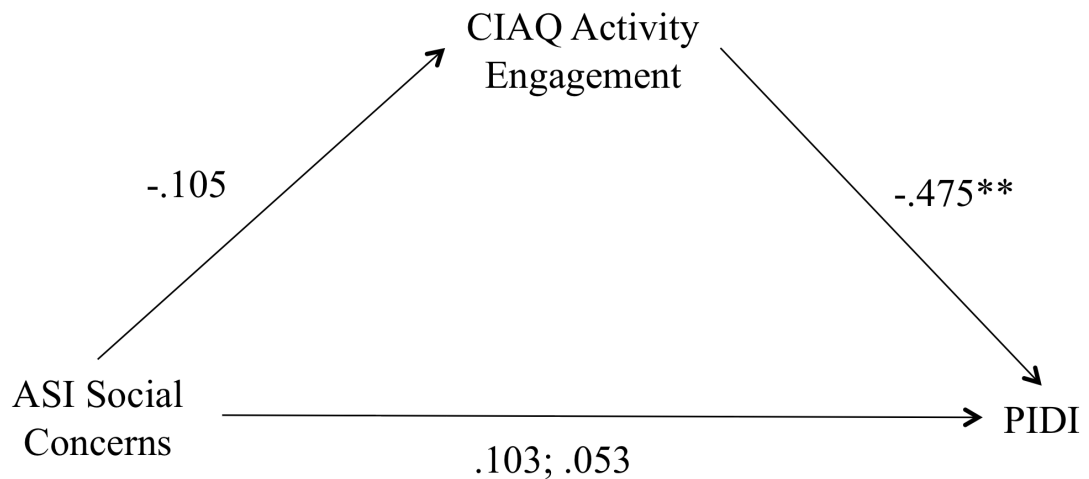


* $p < .05$; ** $p < .0025$ (Bonferroni correction).

Figure 12. Standardized Coefficients (beta) Derived Using Linear Regression Testing for the Mediating Effect of Chronic Illness Acceptance – Activity Engagement in the Relationship between Anxiety Sensitivity – Cognitive Concerns and Perceived Illness Disability Score

In the fourth model, linear regressions were conducted to determine the mediating effect of Chronic Pain Acceptance – Activity Engagement on the relationship between Anxiety Sensitivity – Social Concerns and Perceived Illness Disability (Figure 13). First, Activity Engagement was regressed onto Social Concerns ($r^2 = .055, p = .082$). Next, Perceived Illness Disability was regressed onto Activity Engagement ($r^2 = .234, p <$

.001). Then Perceived Illness Disability was regressed onto Social Concerns ($r^2 = .029$, $p = .095$). Finally, Perceived Illness Disability was regressed onto both Social Concerns and Activity Engagement. Inclusion of Activity Engagement reduced the standardized beta weight between Social Concerns and Perceived Illness Disability from .103 to .053 ($p = .331$). A Sobel test was then conducted to determine the significance of mediation ($Z = 1.71$, $p = .09$; Table 4).

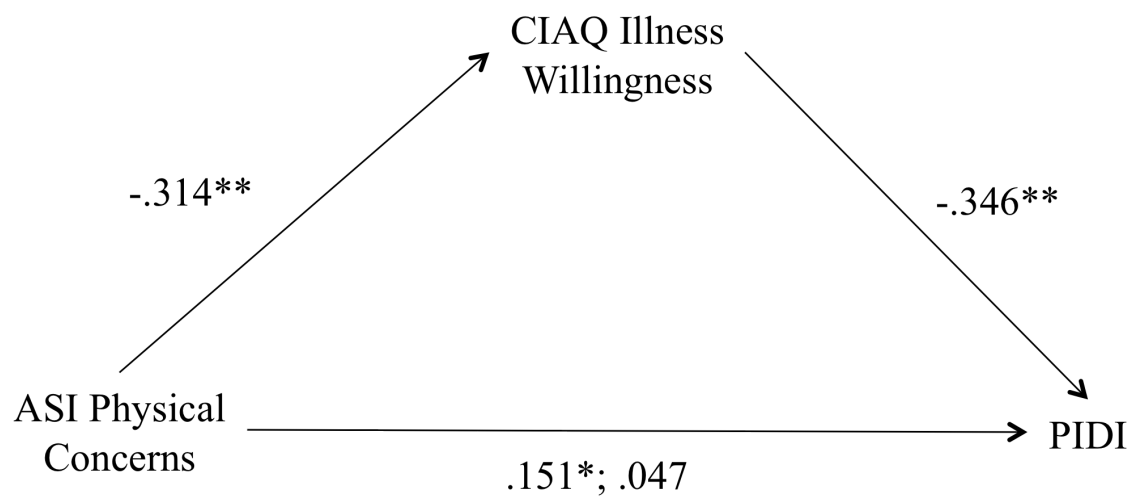


* $p < .05$; ** $p < .0025$ (Bonferroni correction).

Figure 13. Standardized Coefficients (beta) Derived Using Linear Regression Testing for the Mediating Effect of Chronic Illness Acceptance – Activity Engagement in the Relationship between Anxiety Sensitivity – Social Concerns and Perceived Illness Disability Score

In the fifth model, linear regressions were conducted to determine the mediating effect of Chronic Pain Acceptance – Illness Willingness on the relationship between Anxiety Sensitivity – Physical Concerns and Perceived Illness Disability (Figure 14). First, Illness Willingness was regressed onto Physical Concerns ($r^2 = .135$, $p < .001$).

Next, Perceived Illness Disability was regressed onto Illness Willingness ($r^2 = .134, p < .001$). Then Perceived Illness Disability was regressed onto Physical Concerns ($r^2 = .041, p = .011$). Finally, Perceived Illness Disability was regressed onto both Physical Concerns and Illness Willingness. Inclusion of Illness Willingness reduced the standardized beta weight between Physical Concerns and Perceived Illness Disability from .151 to .047 ($p = .430$). A Sobel test was then conducted to determine the significance of mediation ($Z = 4.11, p \leq .001$; Table 4).

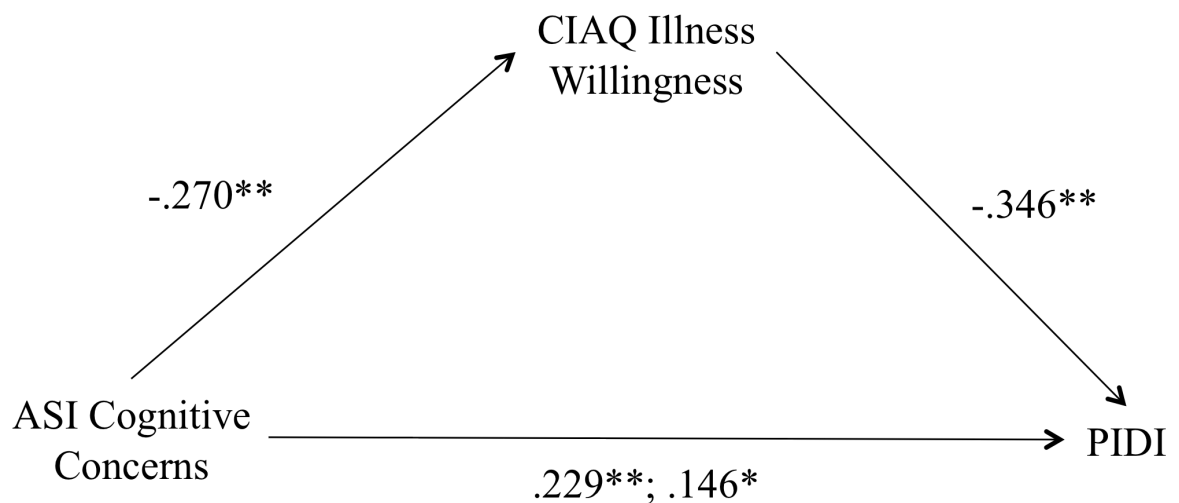


* $p < .05$; ** $p < .0025$ (Bonferroni correction).

Figure 14. Standardized Coefficients (beta) Derived Using Linear Regression Testing for the Mediating Effect of Chronic Illness Acceptance – Illness Willingness in the Relationship between Anxiety Sensitivity – Physical Concerns and Perceived Illness Disability Score

In the sixth model, linear regressions were conducted to determine the mediating effect of Chronic Pain Acceptance – Illness Willingness on the relationship between Anxiety Sensitivity – Cognitive Concerns and Perceived Illness Disability (Figure 15).

First, Illness Willingness was regressed onto Cognitive Concerns ($r^2 = .109, p < .001$). Next, Perceived Illness Disability was regressed onto Illness Willingness ($r^2 = .134, p < .001$). Then Perceived Illness Disability was regressed onto Cognitive Concerns ($r^2 = .070, p < .001$). Finally, Perceived Illness Disability was regressed onto both Cognitive Concerns and Illness Willingness. Inclusion of Illness Willingness reduced the standardized beta weight between Cognitive Concerns and Perceived Illness Disability from .229 to .146 ($p = .013$). A Sobel test was then conducted to determine the significance of mediation ($Z = 3.73, p \leq .001$; Table 4).

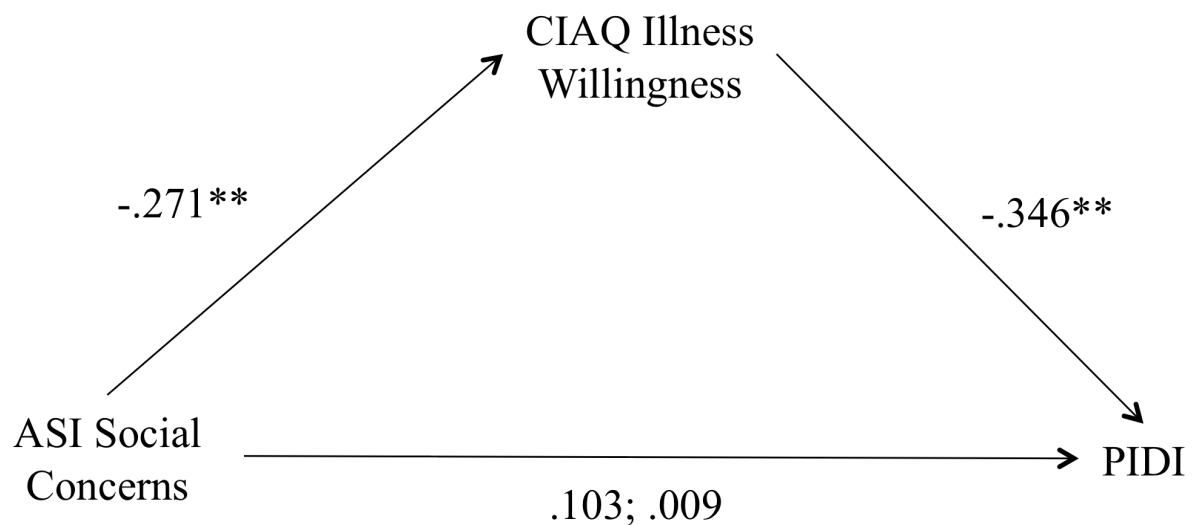


* $p < .05$; ** $p < .0025$ (Bonferroni correction).

Figure 15. Standardized Coefficients (beta) Derived Using Linear Regression Testing for the Mediating Effect of Chronic Illness Acceptance – Illness Willingness in the Relationship between Anxiety Sensitivity – Cognitive Concerns and Perceived Illness Disability Score

In the seventh model, linear regressions were conducted to determine the mediating effect of Chronic Pain Acceptance – Illness Willingness on the relationship

between Anxiety Sensitivity – Social Concerns and Perceived Illness Disability (Figure 16). First, Illness Willingness was regressed onto Social Concerns ($r^2 = .106, p < .001$). Next, Perceived Illness Disability was regressed onto Illness Willingness ($r^2 = .134, p < .001$). Then Perceived Illness Disability was regressed onto Social Concerns ($r^2 = .029, p = .095$). Finally, Perceived Illness Disability was regressed onto both Social Concerns and Illness Willingness. Inclusion of Illness Willingness reduced the standardized beta weight between Social Concerns and Perceived Illness Disability from .103 to .009 ($p = .875$). A Sobel test was then conducted to determine the significance of mediation ($Z = 3.62, p \leq .001$; Table 4).



* $p < .05$; ** $p < .0025$ (Bonferroni correction).

Figure 16. Standardized Coefficients (beta) Derived Using Linear Regression Testing for the Mediating Effect of Chronic Illness Acceptance – Illness Willingness in the Relationship between Anxiety Sensitivity – Social Concerns and Perceived Illness Disability Score

Table 4

Sobel Test Results for Models Testing for Mediation

Model	<i>Z</i>	<i>p</i> -value
CIAQ Total Score as mediator of ASI Total Score and PIDI	4.79	< .001
CIAQ Activity Engagement as mediator of ASI Physical Concerns and PIDI	1.78	.07
CIAQ Activity Engagement as mediator of ASI Cognitive Concerns and PIDI	3.52	< .001
CIAQ Activity Engagement as mediator of ASI Social Concerns and PIDI	1.71	.09
CIAQ Illness Willingness as mediator of ASI Physical Concerns and PIDI	4.11	< .001
CIAQ Illness Willingness as mediator of ASI Cognitive Concerns and PIDI	3.73	< .001
CIAQ Illness Willingness as mediator of ASI Social Concerns and PIDI	3.62	< .001

CHAPTER V

DISCUSSION

Chronic illnesses account for 70% of all deaths in the United States (Kung *et al.*, 2008) and affect over 130 million Americans (Wu & Green, 2000). Of those, approximately half suffer from multiple chronic illnesses (Wu & Green, 2000). Furthermore, chronic pain affects roughly 50 million people in the United States and costs more than \$70 billion annually (McCracken *et al.*, 2004; Stewart *et al.*, 2003). Findings from previous studies have demonstrated the effectiveness of behavioral and cognitive-behavioral interventions for the management of chronic illness and chronic pain. However, a need exists to identify more effective forms of chronic illness management.

The purpose of the present study was to examine the role of chronic illness acceptance in the relationship between anxiety sensitivity and perceived illness disability, as well as to broaden the scope of acceptance to be inclusive of all chronic illnesses, not solely chronic pain. Specifically, it was hypothesized that chronic illness acceptance, and its constituent factors activity engagement and illness willingness, would serve to mediate the relationship between anxiety sensitivity – including physical, cognitive, and social concerns – and perceived illness disability.

Sample Characteristics

The sample (N = 292) from the present study was primarily Caucasian, female, and married (Table 1). The most commonly endorsed diagnoses were hypertension (n = 82), asthma (n = 68), diabetes (n = 52), and chronic obstructive pulmonary disease (COPD; n = 52; Table 2). The mean number of chronic illnesses was 2.72 (SD = 1.59).

Data from the present study were normally distributed for the Chronic Illness Acceptance Questionnaire and Perceived Illness Disability Index (Table 3). However, for the Anxiety Sensitivity Index-III, the data were leptokurtic. In other words, the data were highly concentrated around the mean due to decreased variability in responses (Tabachnick & Fidell, 2001). This implies that participants tended to answer items from the Anxiety Sensitivity Index-III in a similar way to one another.

Mediation Analyses

Analyses of mediation were conducted according to the method proposed by Baron and Kenny (1986; see above). In total, there were seven sets of linear regressions testing for the mediating effect of acceptance in the relationship between anxiety sensitivity and perceived disability (Figures 3-9). In the first model, inclusion of Chronic Illness Acceptance Total Score rendered the previously significant relationship between Anxiety Sensitivity Total Score and Perceived Illness Disability nonsignificant (Figure 10). Following this first set of regressions, a Sobel test was conducted to determine the significance of mediation. The Sobel test statistic ($Z = 4.79$) was significant ($p < .001$), indicating that Chronic Illness Acceptance Total Score significantly mediated the relationship between Anxiety Sensitivity Total Score and Perceived Illness Disability.

In the second model, inclusion of Chronic Illness Acceptance – Activity Engagement rendered the previously significant relationship between Anxiety Sensitivity – Physical Concerns and Perceived Illness Disability nonsignificant (Figure 11). However, according to the method proposed by Baron and Kenny (1986), several conditions must be satisfied in order for a variable to be considered as a mediator. In this model, Anxiety Sensitivity – Physical Concerns did not significantly predict Chronic

Illness Acceptance – Activity Engagement (Path a in Figure 2). Therefore, Chronic Illness Acceptance – Activity Engagement may not be considered a mediator in the relationship between Anxiety Sensitivity – Physical Concerns and Perceived Illness Disability. Furthermore, the Sobel test ($Z = 1.78$) was not significant ($p = .07$).

Based on results of the Sobel test conducted in the third model, it would appear that Chronic Illness Acceptance – Activity Engagement was a significant mediator of the relationship between Anxiety Sensitivity – Cognitive Concerns and Perceived Illness Disability ($Z = 3.52, p < .001$). However, inclusion of Chronic Illness Acceptance – Physical Concerns did not significantly attenuate the relationship between the predictor and criterion variables, and as a result may not be considered a mediator.

In the fourth model (Figure 13), the only significant relationship found between any of the variables was that of Chronic Illness Acceptance – Activity Engagement and Perceived Illness Disability ($\beta = -.475, p < .001$). Therefore, Chronic Illness Acceptance – Activity Engagement did not mediate the relationship between Anxiety Sensitivity – Social Concerns and Perceived Illness Disability. Results from the Sobel test confirmed this conclusion ($Z = 1.71, p = .09$).

In the fifth model (Figure 14), including Chronic Illness Acceptance – Illness Willingness rendered the previously significant relationship between Anxiety Sensitivity – Physical Concerns and Perceived Illness Disability nonsignificant. The follow-up Sobel test was significant ($Z = 4.11, p < .001$), indicating that Chronic Illness Acceptance – Illness Willingness was significant mediator. However, with the Bonferroni-corrected criterion alpha of $< .0025$, Anxiety Sensitivity – Physical Concerns did not account for variance significantly different from zero in Perceived Illness Disability ($\beta = .151, p =$

.011). As a result, in this sample Chronic Illness Acceptance – Illness Willingness was not a significant mediator of Anxiety Sensitivity – Physical Concerns and Perceived Illness Disability.

Results from the Sobel test conducted in the sixth model indicated that Chronic Illness Acceptance – Illness Willingness significantly mediated the relationship between Anxiety Sensitivity – Cognitive Concerns and Perceived Illness Disability ($Z = 3.73, p < .001$). However, inclusion of Chronic Illness Acceptance – Illness Willingness did not significantly attenuate the relationship between predictor and criterion variables, and therefore may not be considered a mediator of that relationship.

Finally, despite the significance of the Sobel test in the seventh model ($Z = 3.62, p < .001$), Anxiety Sensitivity – Social Concerns did not significantly predict Perceived Illness Disability ($\beta = .103, p .095$). Therefore, Chronic Illness Acceptance – Illness Willingness may not be considered a mediator of that relationship.

In general, results from the Sobel tests alone would seem to indicate that chronic illness acceptance was a strong mediator of anxiety sensitivity and perceived disability (Table 4). Indeed, only of two of the seven tests were not significant. However, as mentioned, the Sobel test is simply a measure of indirect effect, as measured by the standard error and beta coefficients of paths *a*. and *b*. in Figure 2. In order for mediation to exist, the following conditions must be satisfied:

(a) variations in levels of the independent variable significantly account for variations in the presumed mediator (i.e., Path *a*), (b) variations in the mediator significantly account for variations in the dependent variable (i.e., Path *b*), and (c) when Paths *a* and *b* are controlled, a previously significant relation between the independent and dependent variables is no longer significant... (Baron & Kenny, 1986)

According to this method for testing mediation, therefore, only 2 models from the present study (1 with Bonferroni correction applied) meet criteria for chronic illness acceptance mediating the relationship between anxiety sensitivity and perceived illness disability, regardless of the results of the Sobel tests.

Bootstrapping is a useful technique when data are non-normally distributed. However, because the Sobel test is a more conservative test of significance of mediation, and due to the largely nonsignificant results of the present study, it was determined that conducting bootstrapping was not necessary.

The nonsignificant findings in this sample of the mediating effect of chronic illness acceptance in the relationship between anxiety sensitivity and perceived illness disability were somewhat surprising and counter to similar study findings in which illness acceptance served as a robust mediator. Of note, in a study that was conducted with the chronic pain-only subsample of the present study sample, Herbst *et al.* (2013) found that chronic illness acceptance, including activity engagement and illness willingness, served as a significant mediator(s) in the relationship between anxiety sensitivity and perceived illness disability. In that study, all models except those including Anxiety Sensitivity – Social Concerns were significant, with Sobel test statistics ranging from $Z = 1.89$ to $Z = 3.14$ (p 's = .003 - .037).

Additionally, a study conducted with another sample, and using the Chronic Pain Acceptance Questionnaire (Herbst *et al.*, 2011), found similar results to the previously mentioned study. Specifically, the three models tested (Chronic Pain Acceptance Total Score, Chronic Pain Acceptance – Activity Engagement, and Chronic Pain Acceptance – Pain Willingness as mediating the relationship between anxiety sensitivity and perceived

disability) were all significant. Indeed, inclusion of Chronic Pain Acceptance Total Score reduced the standardized beta between Anxiety Sensitivity Total Score and Perceived Disability to $\beta = .006$ ($p = .918$), indicating nearly complete mediation. In other words, anxiety sensitivity accounted for almost zero unique variance in perceived disability when chronic pain acceptance was introduced into the regression equation.

Given the contrast of the findings from the present study compared to previous similar studies, it is plausible to conclude that there is a meaningful difference in the experience of chronic pain versus other chronic illnesses, given that previous findings of the significant mediating effect of acceptance were observed only in chronic pain patients. Recalling that anxiety sensitivity is “the fear of anxiety-related bodily sensations (e.g., fears of palpitations, dizziness, concentration difficulties), which arises from beliefs that these sensations have harmful somatic, psychological, or social consequences” (Asmundson & Taylor, 1996, p. 578), it is reasonable to assume that individuals with chronic pain are more likely to endorse symptoms of anxiety sensitivity, as a result of the increased bodily awareness associated with chronic pain. For example, Barsky and Klerman (1983) found that chronic pain is associated with a hypervigilance of somatic sensations. Many chronic illnesses, on the other hand, are not associated with the same level or intensity of physical conditions as chronic pain (e.g., hypertension). Thus, perhaps anxiety sensitivity is more salient in chronic pain than in other chronic illnesses. For example, when one considers some of the most common chronic illnesses, such as hypertension and diabetes, there are few, if any, noticeable symptoms early in the disease progression. This is fundamentally different from the experience of chronic pain, where symptoms are noticeable to the patient at onset. In other words, an individual with

hypertension likely will not key into their symptoms, which is a necessary precursor for the development of anxiety sensitivity.

Limitations and Future Directions

The present study relied on retrospective, self-report data. Inherent in this type of data are inaccuracies of recall and self-report bias. As such, prospective data collection, in which participants are followed and assessed over time, may be preferable, as well as strengthen future study designs (Kazdin, 2003). Furthermore, future studies may benefit from incorporating objective behavioral measures, as well as collateral assessments administered to participant's healthcare providers and/or significant others. Finally, although online data collection is becoming an increasingly utilized and accepted method, it may be possible that there are meaningful differences between those recruited from online venues such as support groups versus clinical samples. Notably, however, previous study findings comparing clinic sample and online sample characteristics suggest that the two are more similar than not (Payne-Murphy & Beacham, 2013).

Summary

Mediation analyses were conducted on a sample of online chronic illness support group members to examine the role of chronic illness acceptance in the relationship between anxiety sensitivity and perceived illness disability. Chronic Illness Acceptance Total Score significantly mediated the relationship between Anxiety Sensitivity Total Score and Perceived Illness Disability. All other models tested were nonsignificant. As discussed, in order for a variable to be considered a mediator, paths a., b., and c. (Figure 2) must be significant, and when controlling for paths a. and b., path c. becomes nonsignificant. The results suggest that chronic illness acceptance does partially mediate

the relationship between anxiety sensitivity and perceived illness disability; however, given the overall lack of significant results, additional investigation in this area may foster a better understanding of the role of illness acceptance in patients with varied and multiple chronic illnesses.

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APPENDIX A

CHRONIC ILLNESS ACCEPTANCE QUESTIONNAIRE (CIAQ)

Directions: below you will find a list of statements. Please rate the truth of each statement as it applies to you. Use the following rating scale to make your choices. For instance, if you believe a statement is 'Always True,' you would write a 6 in the blank next to that statement

0	1	2	3	4	5	6
Never true	Very rarely true	Seldom true	Sometimes true	Often true	Almost always true	Always true

1. I am getting on with the business of living no matter how bad my illness is.....
2. My life is going well, even though I have my illness.....
3. It's OK to experience symptoms related to my illness.....
4. I would gladly sacrifice important things in my life to control my illness better.....
5. It's not necessary for me to control my illness in order to handle my life well.....
6. Although things have changed, I am living a normal life despite my illness.....
7. I need to concentrate on getting rid of symptoms of my illness.....
8. There are many activities I do when I experience symptoms of my illness.....
9. I lead a full life despite having an illness.....
10. Controlling my illness is less important than any other goals in my life.....
11. My thoughts and feelings about my illness must change before I can take important steps in my life.....
12. Despite my illness, I am now sticking to a certain course in my life.....
13. Keeping the symptoms of my illness under control takes first priority whenever I'm doing something.....
14. Before I can make any serious plans, I have to get some control over my illness.....
15. When the symptoms of my illness increase, I can still take care of my responsibilities.....
16. I will have better control over my life if I can control my negative thoughts about my illness.....
17. I avoid putting myself in situations where the symptoms of my illness might increase.....
18. My worries and fears about what my illness will do to me are true.....
19. It's a relief to realize that I don't have to change my illness to get on with my

life.....

20. I have to struggle to do things when I experience symptoms of my illness.....

APPENDIX B

ANXIETY SENSITIVITY INDEX-III (ASI-III)

Please circle the number that best corresponds to how much you agree with each item. If any of the items concern something that is not part of your experience (for example, “It scares me when I feel shaky” for someone who never trembled or felt shaky) answer on the basis of what you expect you think you might feel if you had such an experience. Otherwise, answer all items on the basis of your own experience. Be careful to circle only one number for each item and please answer all items.

	Very little	A little	Some	Much	Very much
21. It is important for me not to appear nervous.	1	2	3	4	5
2. When I cannot keep my mind on a task, I worry that I might be going crazy.	1	2	3	4	5
3. It scares me when my heart beats rapidly.	1	2	3	4	5
4. When my stomach is upset, I worry that I might be seriously ill.	1	2	3	4	5
5. It scares me when I am unable to keep my mind on a task.	1	2	3	4	5
6. When I tremble in the presence of others, I fear what people might think of me.	1	2	3	4	5
7. When my chest gets tight, I get scared that I won't be able to breathe properly.	1	2	3	4	5
8. When I feel pain in my chest, I worry that I'm going to have a heart attack.	1	2	3	4	5
9. I worry that other people will notice my anxiety.	1	2	3	4	5

10. When I feel “spacey” or spaced out I worry that I may be mentally ill.	1	2	3	4	5
11. It scare me when I blush in front of people.	1	2	3	4	5
12. When I notice me heart skipping a beat, I worry that there is something seriously wrong with me.	1	2	3	4	5
13. When I begin to sweat in a social situation, I fear people will think negatively of me.	1	2	3	4	5
14. When my thoughts seem to speed up, I worry that I might be going crazy.	1	2	3	4	5
15. When my throat feels tight, I worry that I could choke to death.	1	2	3	4	5
16. When I have trouble thinking clearly, I worry that there is something wrong with me.	1	2	3	4	5
17. I think it would be horrible to faint in public.	1	2	3	4	5
18. When my mind goes blank, I worry that there is something terribly wrong with me.	1	2	3	4	5

APPENDIX C

PERCEIVED ILLNESS DISABILITY INDEX (PIDI)

Directions: For each of the 7 categories of life listed, please circle the number on the scale which describes the level of disability you *typically* experience. A score of “0” means no disability at all, and a score of “10” signifies that *all* of the activities in which you would normally be involved have been totally disrupted or prevented by your chronic illness.

Family/Home Responsibilities: This category refers to activities related to the home or family. It includes chores or duties performed around the house (e.g. yard work) and errands or favors for other family members (e.g. driving the children to school).

1	2	3	4	5	6	7	8	9	10
No Disability									Total Disability

Recreation: This category includes hobbies, sports, and other similar leisure time activities.

1	2	3	4	5	6	7	8	9	10
No Disability									Total Disability

Social Activity: This category refers to activities, which involve participation with friends and acquaintances other than family members. It includes parties, theater, concerts, dining out, and other social activities.

1	2	3	4	5	6	7	8	9	10
No Disability									Total Disability

Occupation: This category refers to activities that are part of or directly related to one's job. This includes nonpaying jobs as well, such as housewife or volunteer work.

1	2	3	4	5	6	7	8	9	10
No Disability									Total Disability

Sexual Behavior: This category refers to the frequency and quality of one's sex life.

1	2	3	4	5	6	7	8	9	10
No Disability									Total Disability

Self-Care: This category includes activities which involve personal maintenance and independent daily living (e.g., taking a shower, driving, getting dressed, etc.).

1	2	3	4	5	6	7	8	9	10
No Disability									Total Disability

Life-Support Activity: This category refers to basic life-supporting behaviors, such as eating, sleeping, and breathing.

1	2	3	4	5	6	7	8	9	10
No Disability									Total Disability